alized to three-dimensional applications depending on the functionality of the system to be controlled.

[0037] **FIG. 5** is a vector representation of accomplishing the movement illustrated in **FIG. 4**. Specifically, the output of each proximity sensor is used to calculate the speed and direction of a move given the proximity of objects. The direction of the move for a particular sensor is based on the orientation of that sensor and it is assumed that the sensor output is a scalar quantity (e.g. a voltage or single integer). Multiple sensors are attached to the device to provide the desired spatial resolution and coverage of the device. The output from each sensor, which consists of a signal strength (representative of speed) and a direction based on the orientation of each sensor, is then added vectorially to create a composite move vector. This composite move vector accounts for surrounding objects. Such vector addition is implemented in software, firmware or dedicated hardware. The device is then commanded to move with the speed and direction of this composite move vector. For example, the vectors which control movement of the particular device are controlled so that the movement is consistent with the composite move vector.

[0038] Set forth below are descriptions of two embodiments of capacitance sensor arrangements, sometimes referred to herein as user input devices. One embodiment is referred to as an "8-segment" sensor arrangement, and the other embodiment is referred to as a "32-segment" sensor arrangement. Both embodiments are two-dimensional and sense object proximity in a single plane. More particularly, the 8-segment sensor arrangement detects object proximity, while the 32-segment sensor arrangement detects "touch". Therefore, while the 8-segment sensor arrangement uses the vector addition algorithm previously described, the 32-segment sensor arrangement assumes that vectors have a length of either 0 or 1 depending on whether a particular sensor is touched (1) or not touched (0). The sensors are configured to couple to medical equipment. As used in this context, the "configured to couple" means attached to, directly or indirectly.

[0039] Referring to **FIG. 6**, and regarding an **8** segment sensor arrangement **100**, a portion of a core which comprises a circular plastic (e.g., an ABS plastic) ring **102** with a nominal outside diameter of 32 cm is illustrated. Alternatively, the core could be rectangular. The circular shape is the same size as the exterior of the 20 cm X-ray image intensifier used on vascular X-ray imaging products commercially available from GE Medical Systems. Milwaukee, Wis., of General Electric Company. Eight sensor segments **100** are secured to an exterior surface **106** of ring **102**, with each sensor **104** covering a nominally 45° segment. Each 45° segment is divided into a primary sensing area **108**, and a periphery **110** of each segment is covered with a ground plane. The ground plane minimizes cross-segment sensitivity and electrical cross talk between segments. The ground plane also localizes the sensing area, so those objects outside the desired sensing area are not detected. The material shown in **FIG. 6** is a thin copper foil bonded to the ring. Example dimensions are: A=5.13 inches, B=2.6 inches, C=0.36 inches, and D=0.125 inches.

[0040] In the example embodiment, the sizes of each segment and ground planes were chosen based on a nominal finite element analysis shown in **FIG. 7**. The sensor has a sensitive area between 3 and 5 cm away from the exterior surface.

[0041] Each sensing area is connected to capacitive sensor electronics as shown in **FIG. 8**. The sensor arrangements include capacitive units **112** which, in one embodiment, are model QT9701B-S sensor units commercially available from Quantum Research Group, United Kingdom. Each sensor unit **112** is coupled, via an 8 channel serial interface **114** with an RS232 communications link, to a processor, illustrated as a personal computer (PC) **116**. Of course, other communication links can be used. The processor need not be a PC, however, and can be any device capable of performing the processing functions described below. The QT9701B-S sensor unit also contains approximately 20 configurable parameters, which can be configured over the serial communications link. The software configuration interface ensures that all eight QT9701B-S sensor units are configured identically so that the sensor sensitivity is uniform around the sensor periphery. In some applications, a non-uniform sensitivity may be desired, and either sensor units **112** can be configured differently, or the signal from each sensor unit **112** on processor **116** can be interpreted differently.

[0042] In **FIG. 8, a** software interface **118** for displaying configuration information on personal computer **116** also is illustrated. Rather than actually connecting 8-segment sensor **100** to imaging equipment, the speed and direction of move information is computed using the vector addition algorithm. An arrow displayed on a PC display **120** then indicates the direction of the computed move. The speed of the computed move is represented by the size of the arrow, with a larger arrow representing a higher speed. Thus, information about both the direction and speed that the imaging equipment would move in response to people and objects is displayed, while not requiring the complete imaging system.

[0043] Sensor units **112** operate autonomously, with no synchronization between the sensor excitation/readout. Of course, for a synchronized implementation, integrated electronics would facilitate synchronization between the excitation and measurement of each sensing segment, and therefore further reduce cross-channel interference and sensitivity.

[0044] Regarding the 32-segment sensor arrangement, like the 8-segment embodiment described above, a ring with a nominal outside diameter of 32 cm is utilized. In the example embodiment, the capacitive sensor units used are model QT60320 sensor units, commercially available from Quantum Research Group, United Kingdom. These sensor units are generally known as capacitance based matrix touch switches.

[0045] The QT60320 sensor unit detects the capacitive coupling of electromagnetic fields. The matrix switch can be envisioned as 4 rows and 8 columns of "wires". The intersection of a particular row with a particular column is a "switch", though electrically there is no true intersection of the rows with the columns. Each of these wires is excited by the electronics and creates an electromagnetic field. When a finger, hand, or other object is placed in close proximity of any intersection, the electromagnetic field of the corresponding row and corresponding column are coupled, and this particular "switch" is turned ON. The output of the sensor at